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Meissen

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(54) **CONNECTOR FOR SUPPORT STRUCTURES**

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B65D 19/38 (2006.01)

(52) **U.S. Cl.** **108/54.1**; 108/64

(58) **Field of Classification Search** 108/64, 108/54.1, 56.1, 56.3, 51.11; 706/504; 748/346.07; 312/111; 446/124, 125, 126, 117, 103, 166; 249/119

See application file for complete search history.

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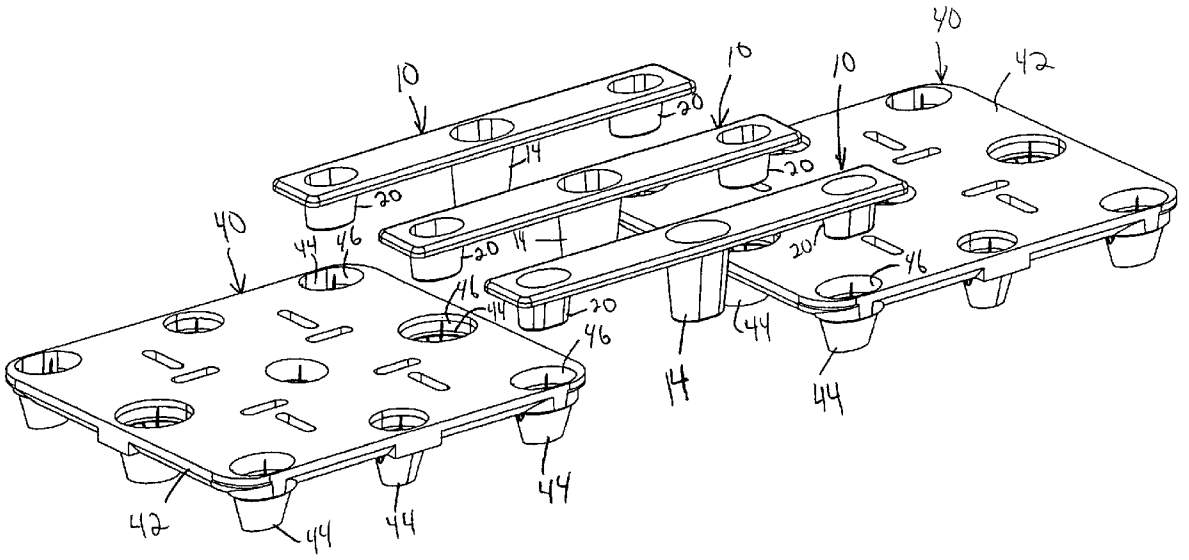
(57) **ABSTRACT**

A connector selectively connects at least two support structures to provide a larger, rigid support structure. The connector includes a body portion from which extends downward a center support portion. A pair of outer sleeves extend downwardly from the body portion on opposite sides of the center support portion, each outer sleeve extending downwardly less than the center support portion. In use, the outer sleeves are inserted through openings in the support structures into the feet of the support structures. The body portion rests on the decks of the support structures and the center support portion extend downward from the body portion between the support structures. The center support portion is sized to extend to the floor when the connector is connected to the support structures.

9 Claims, 16 Drawing Sheets



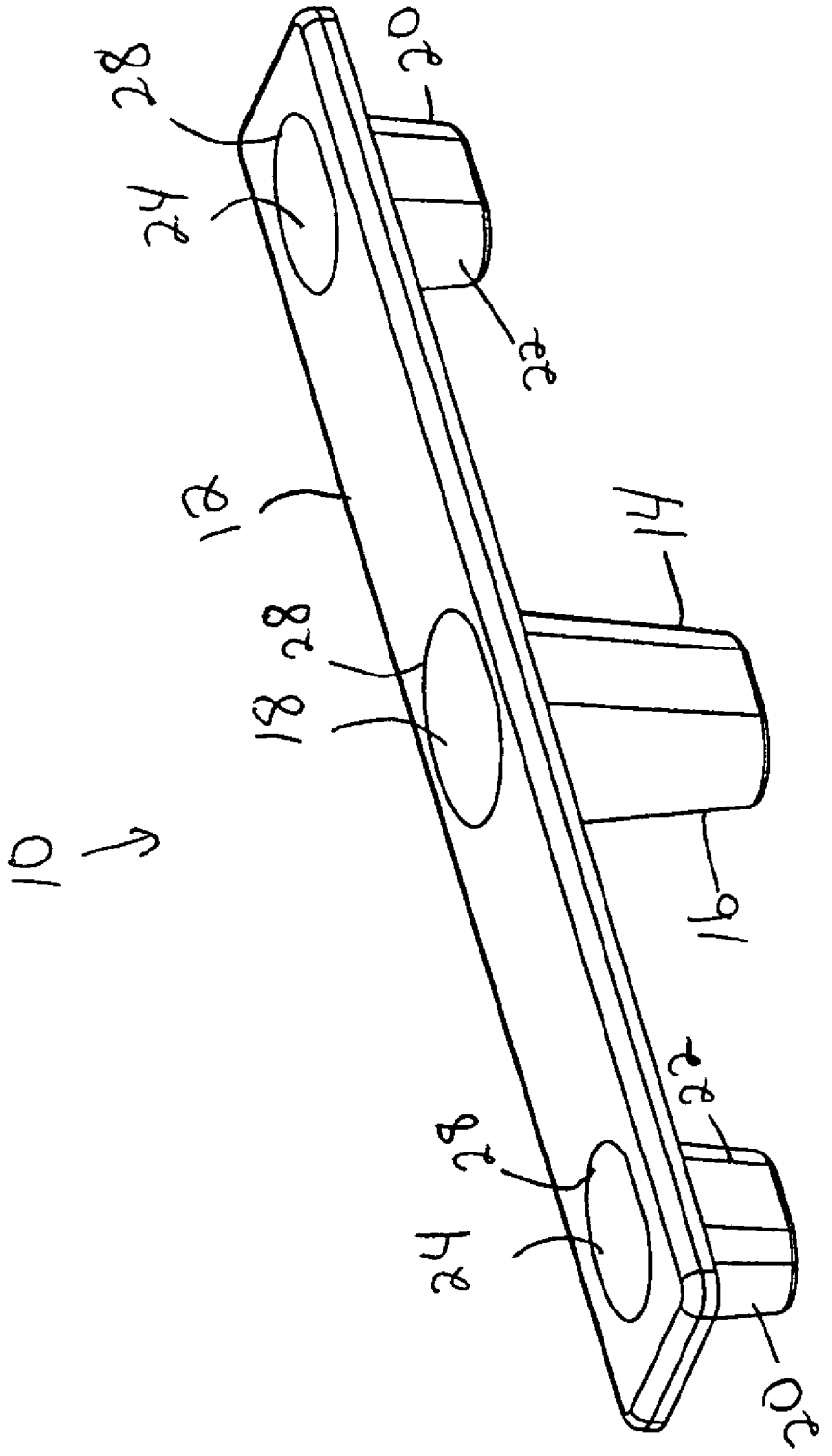


Figure 1

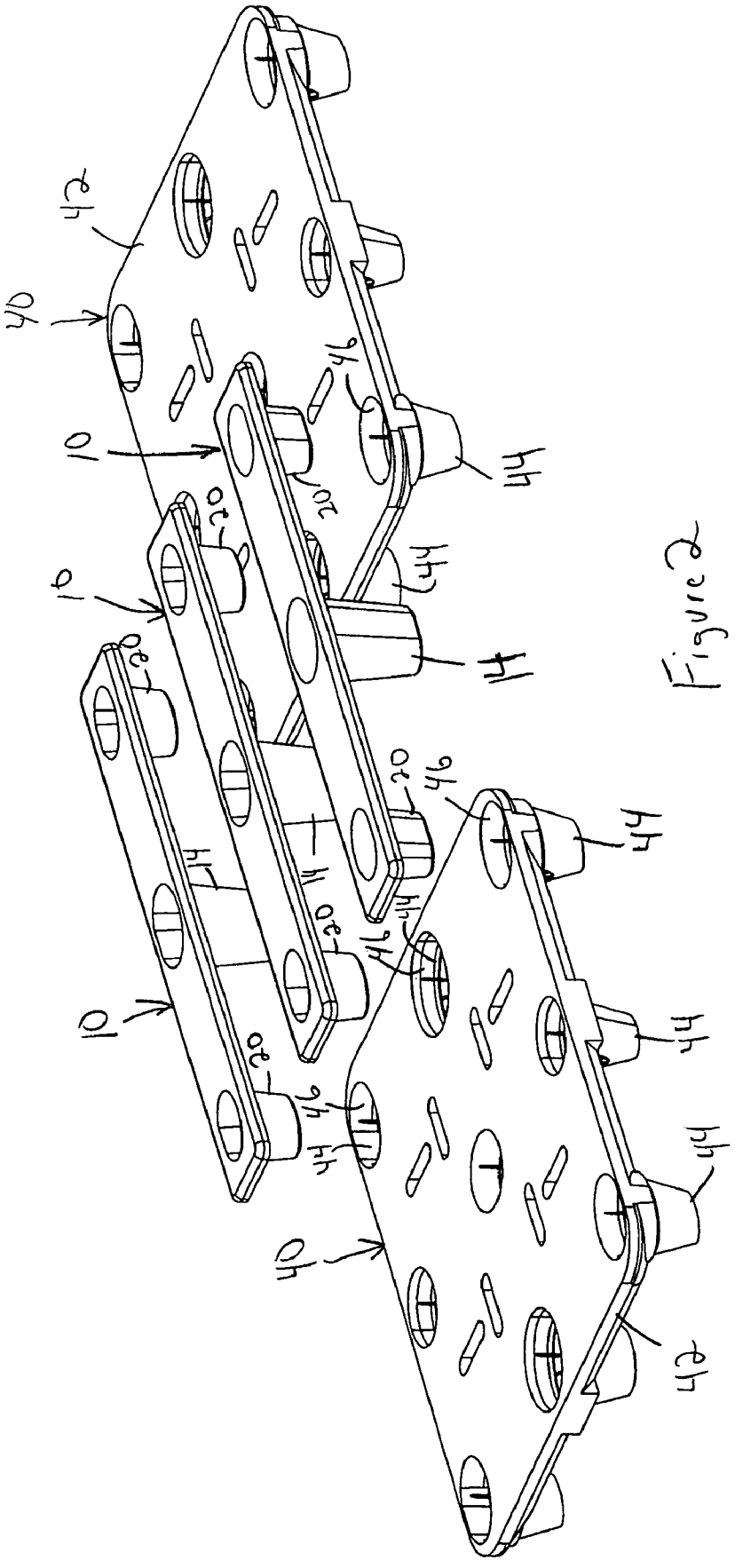


Figure 2

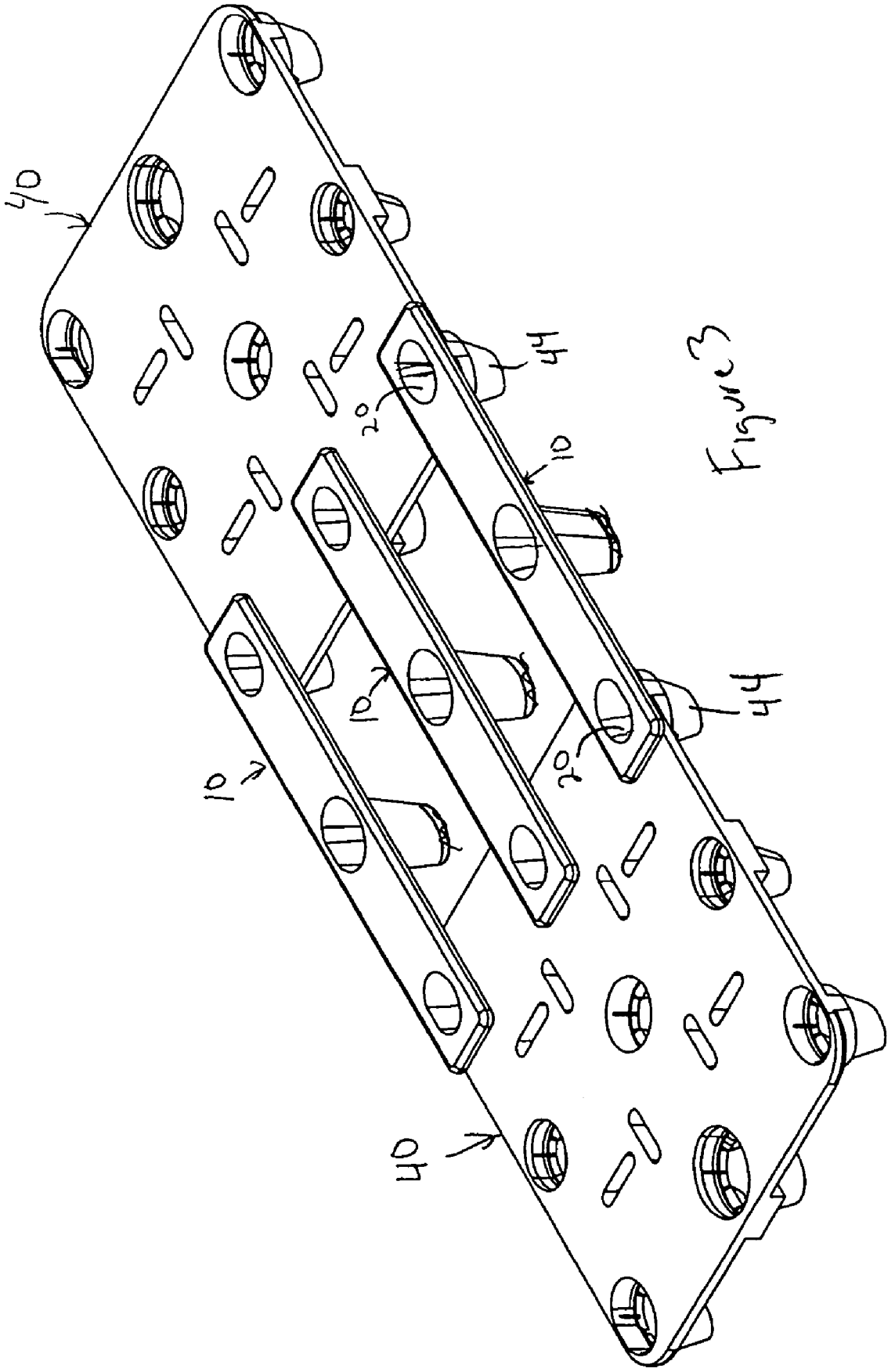


Figure 3

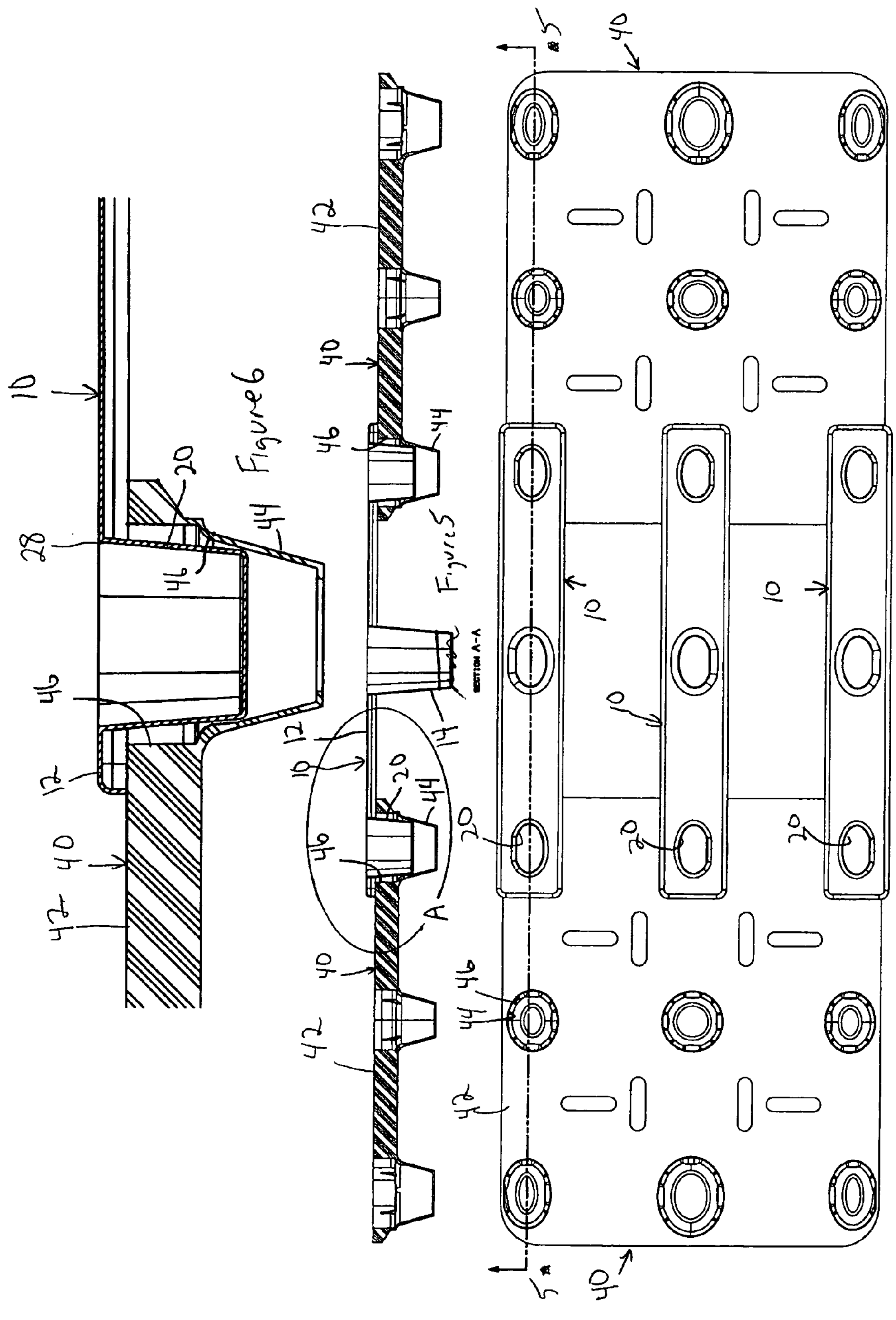
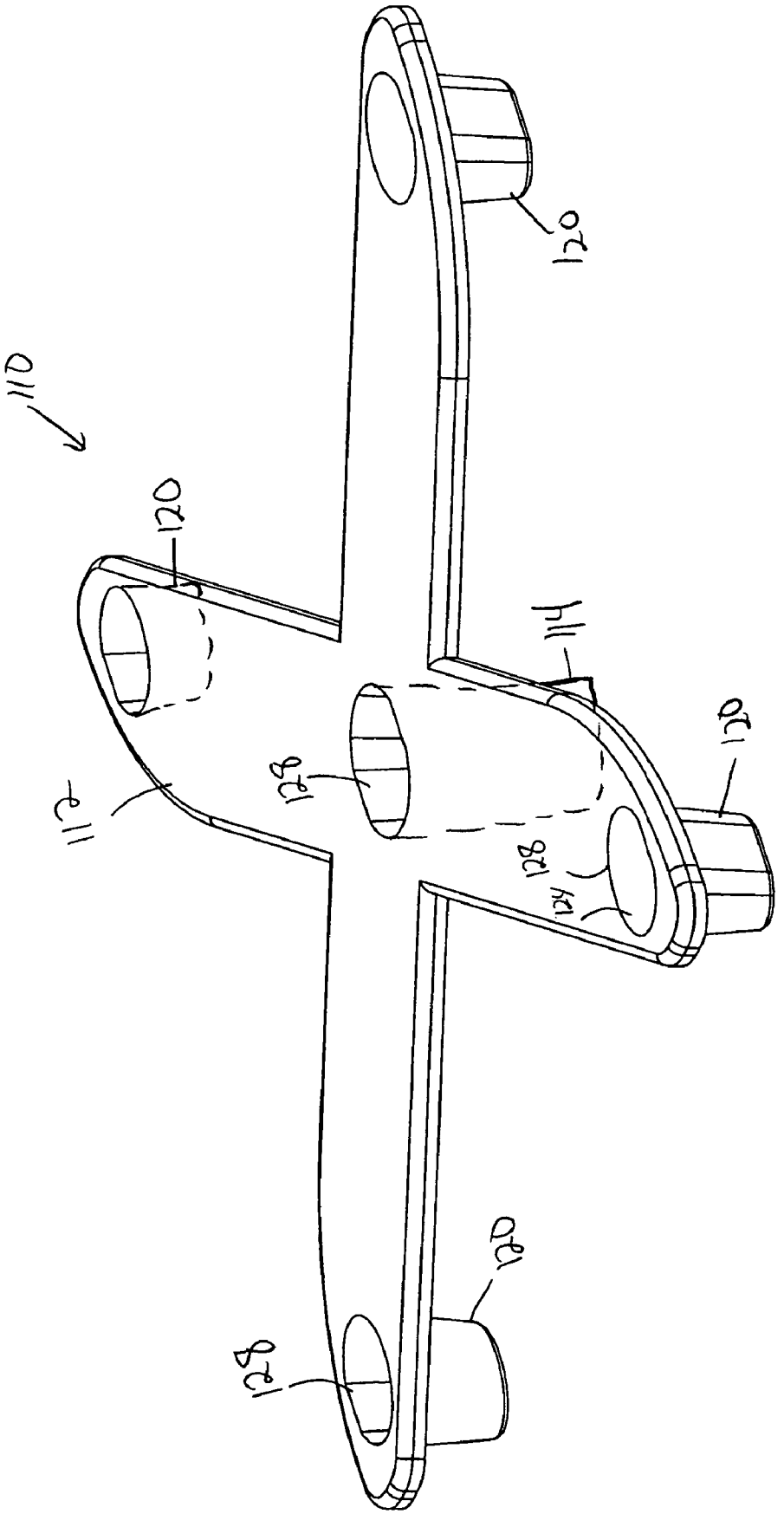


Figure 6

Figure 5

Figure 4



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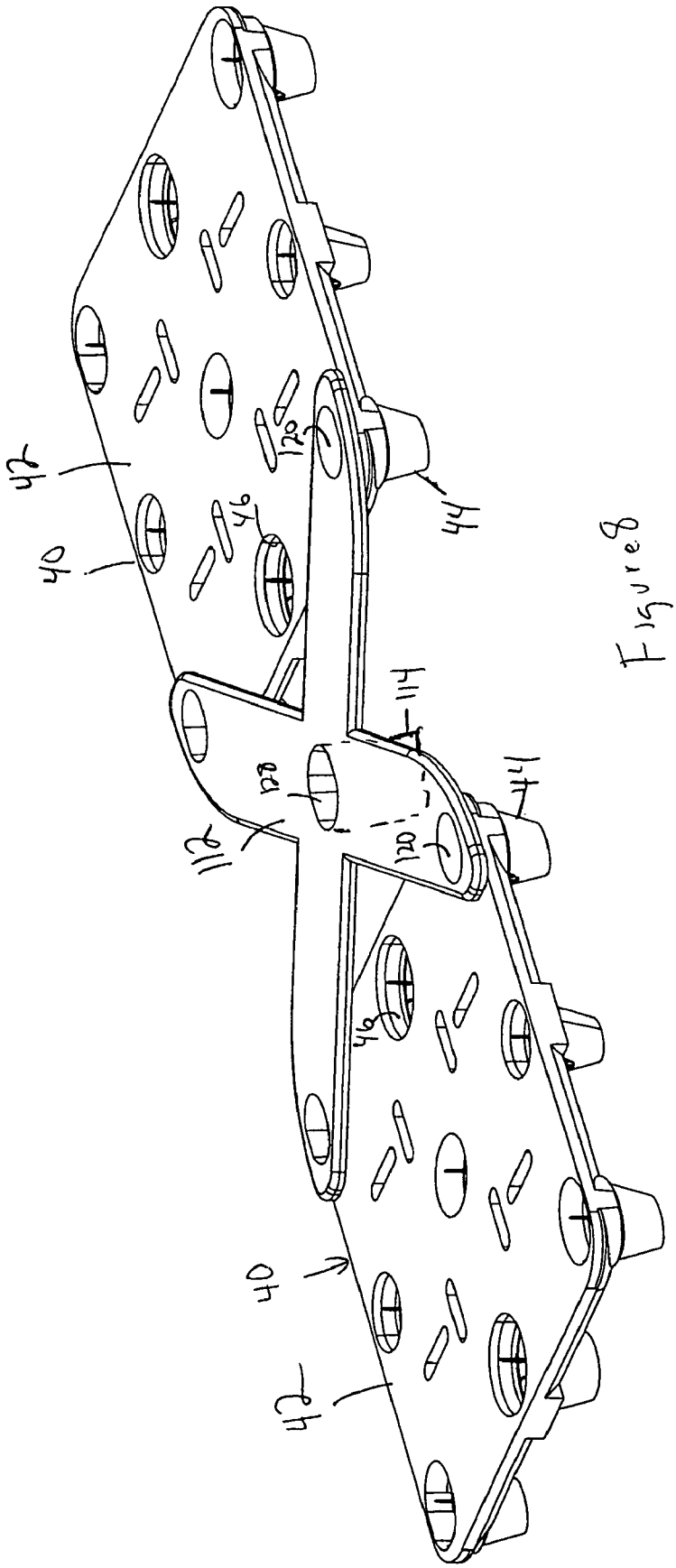

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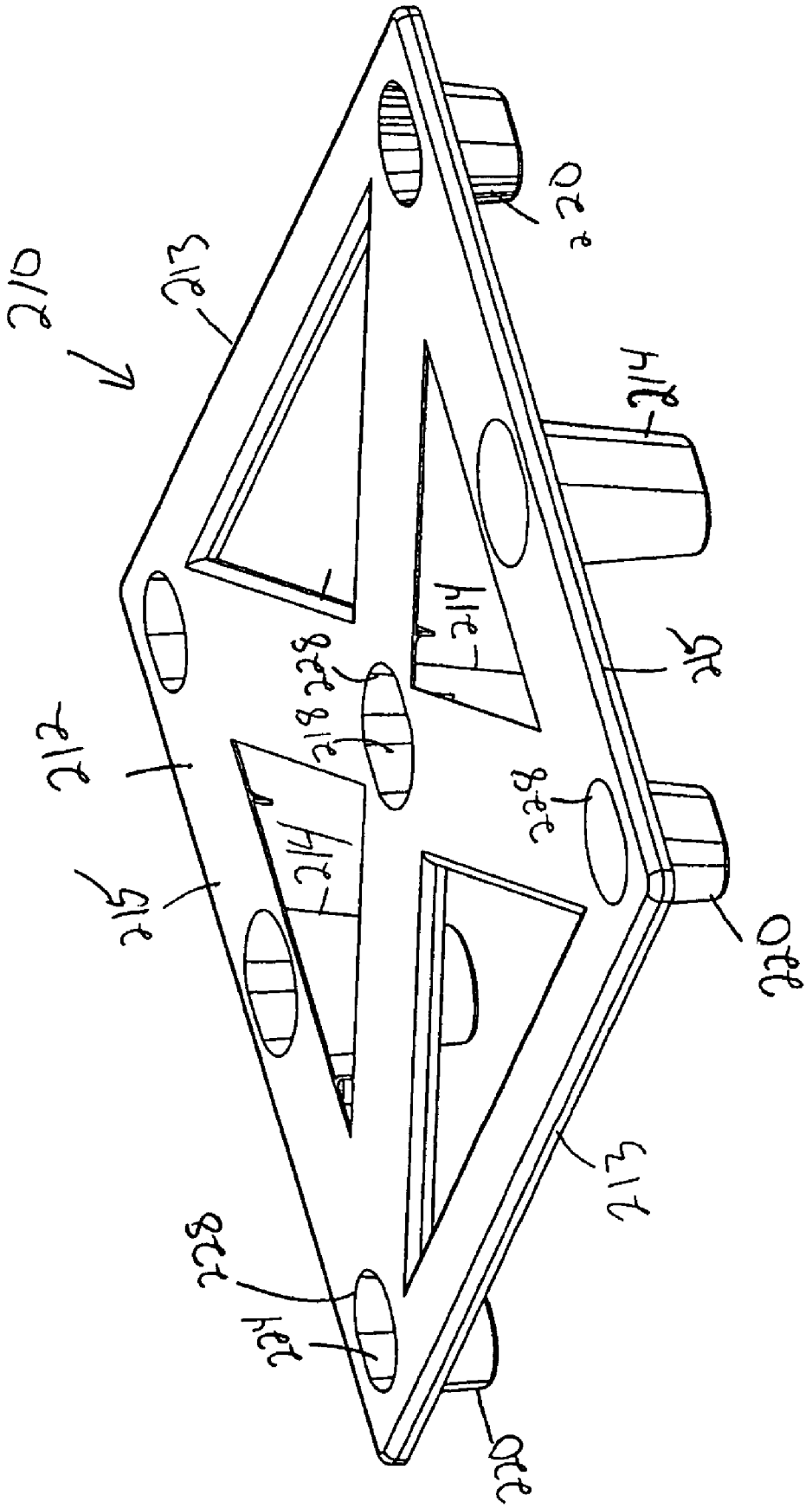


Figure 9

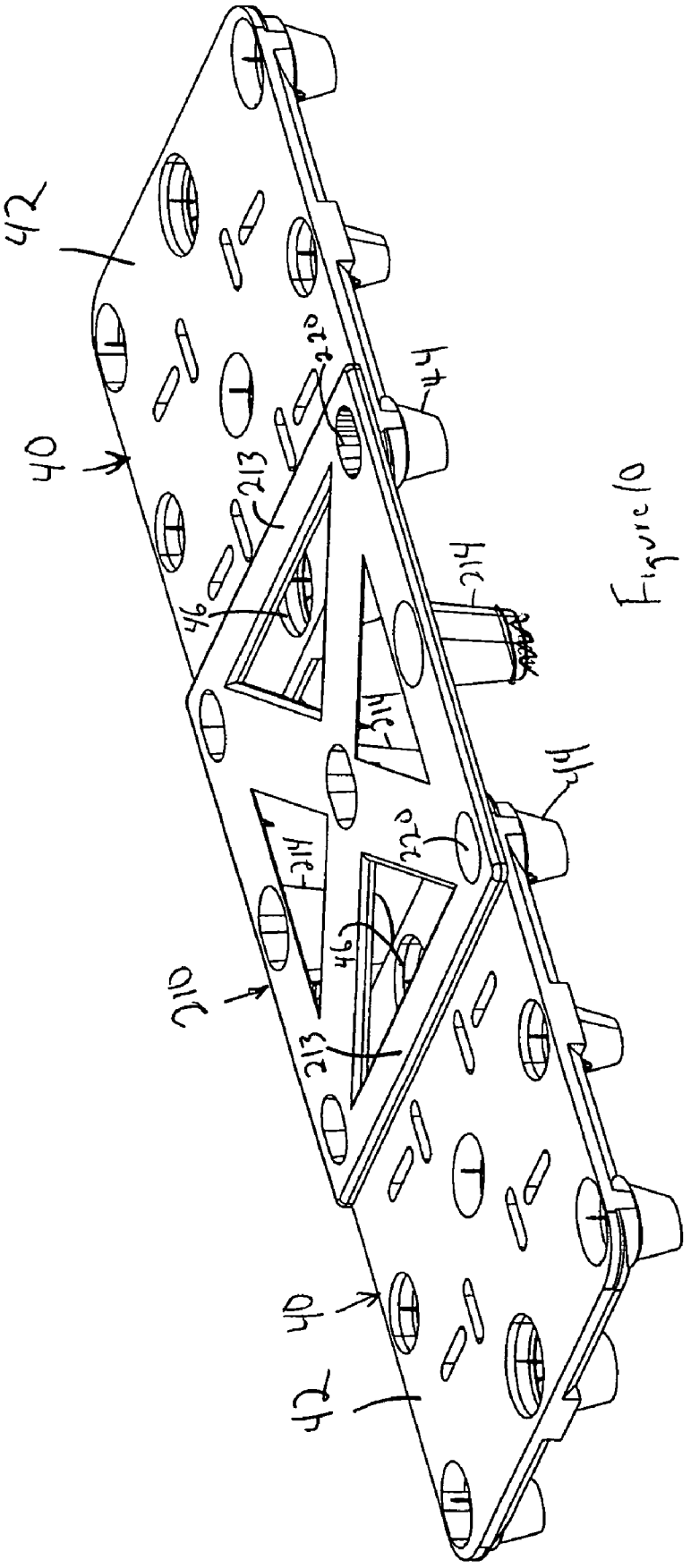


Figure 10

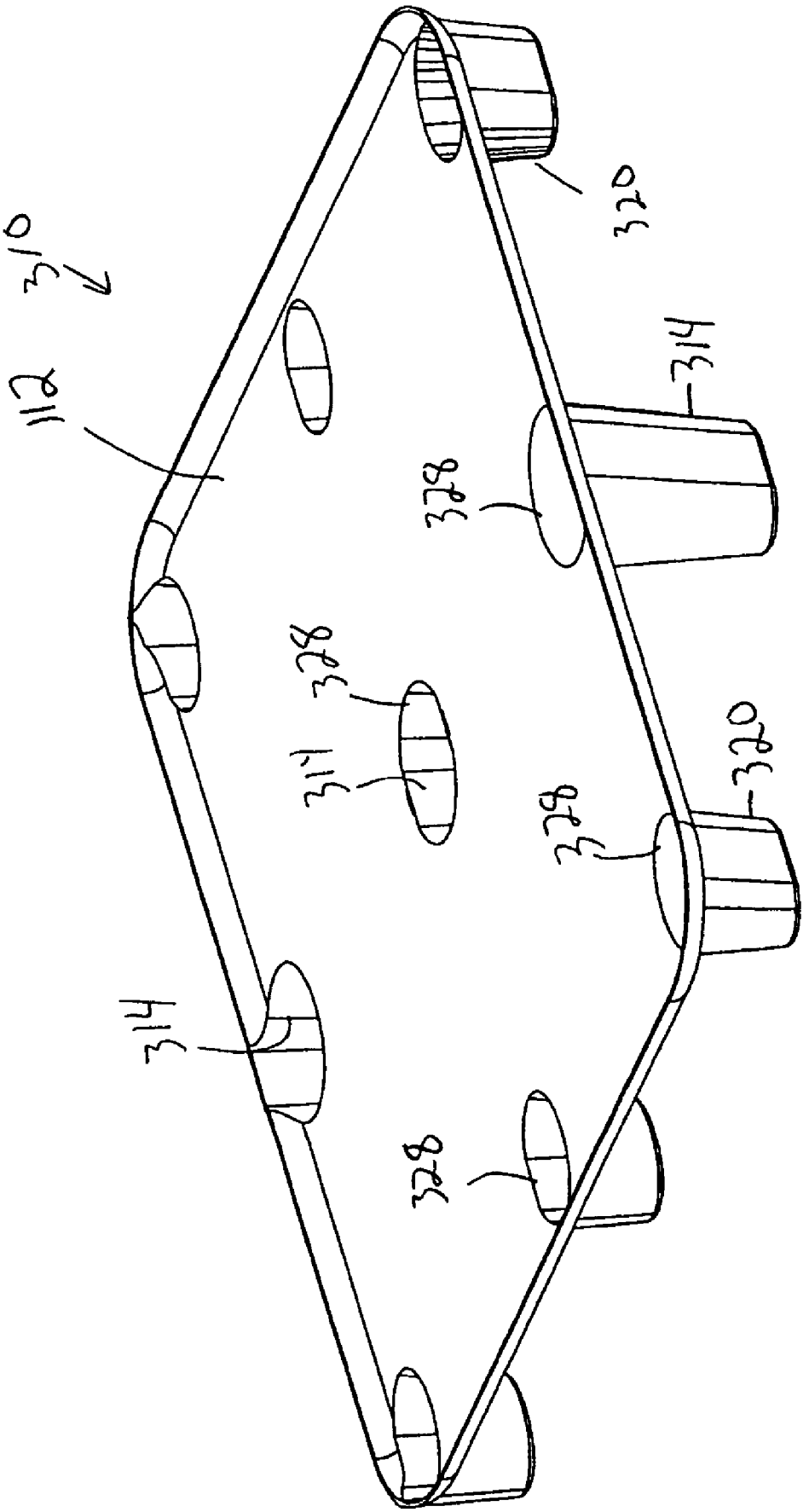


Figure 11

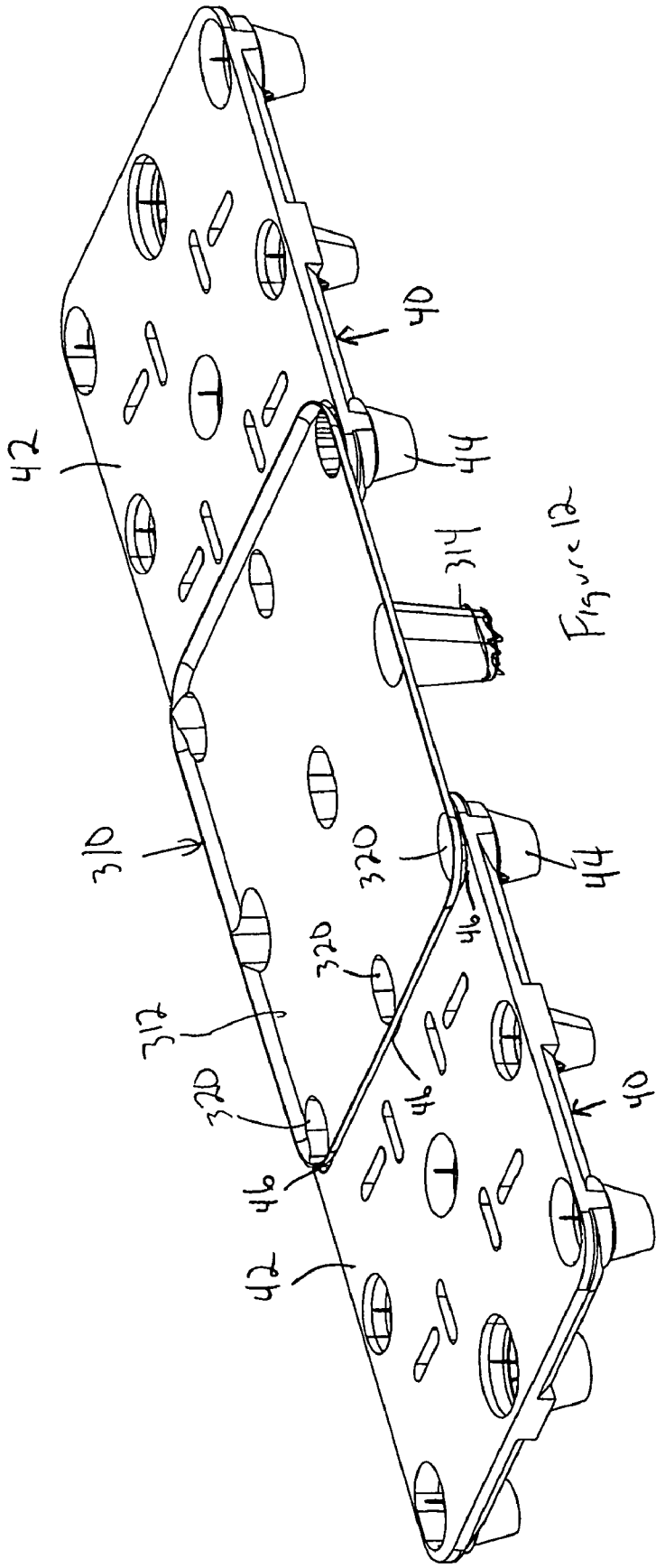


Figure 12

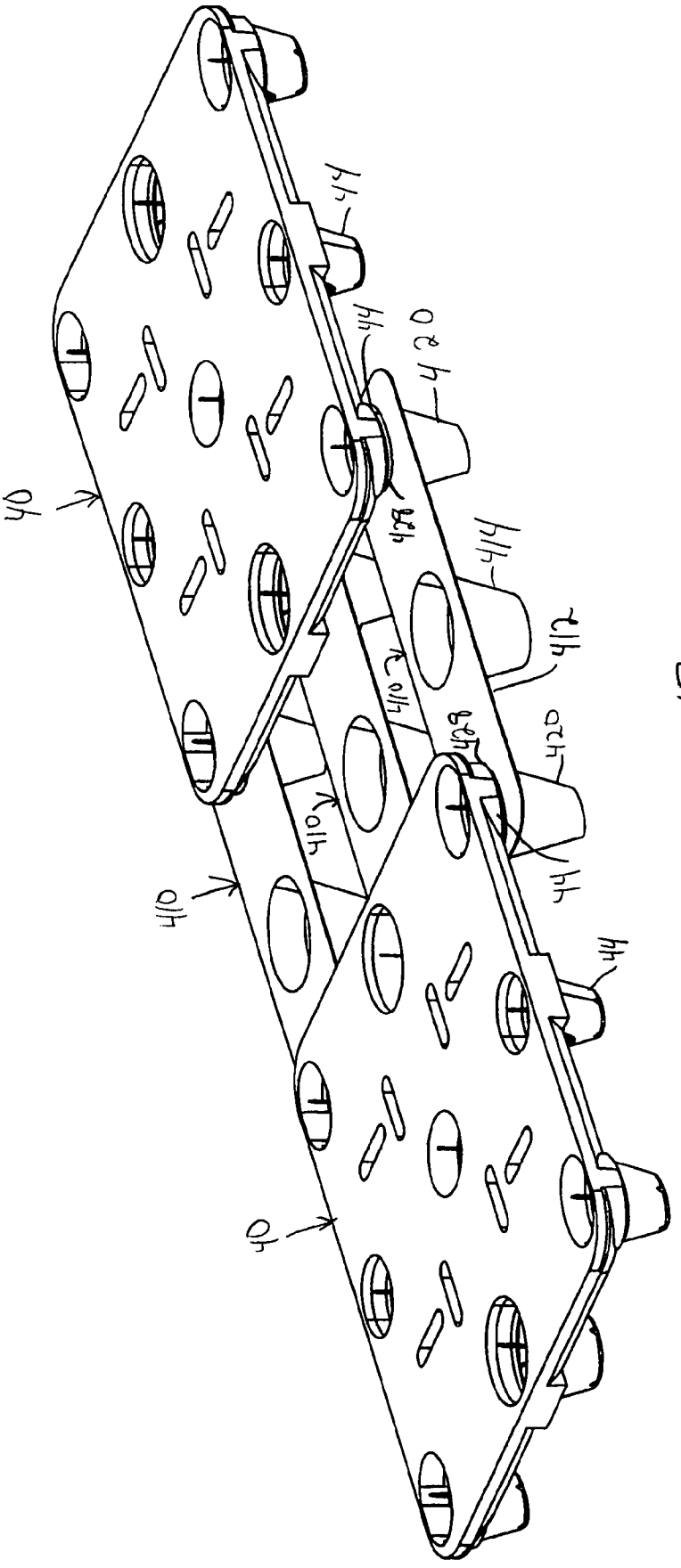


Figure 13

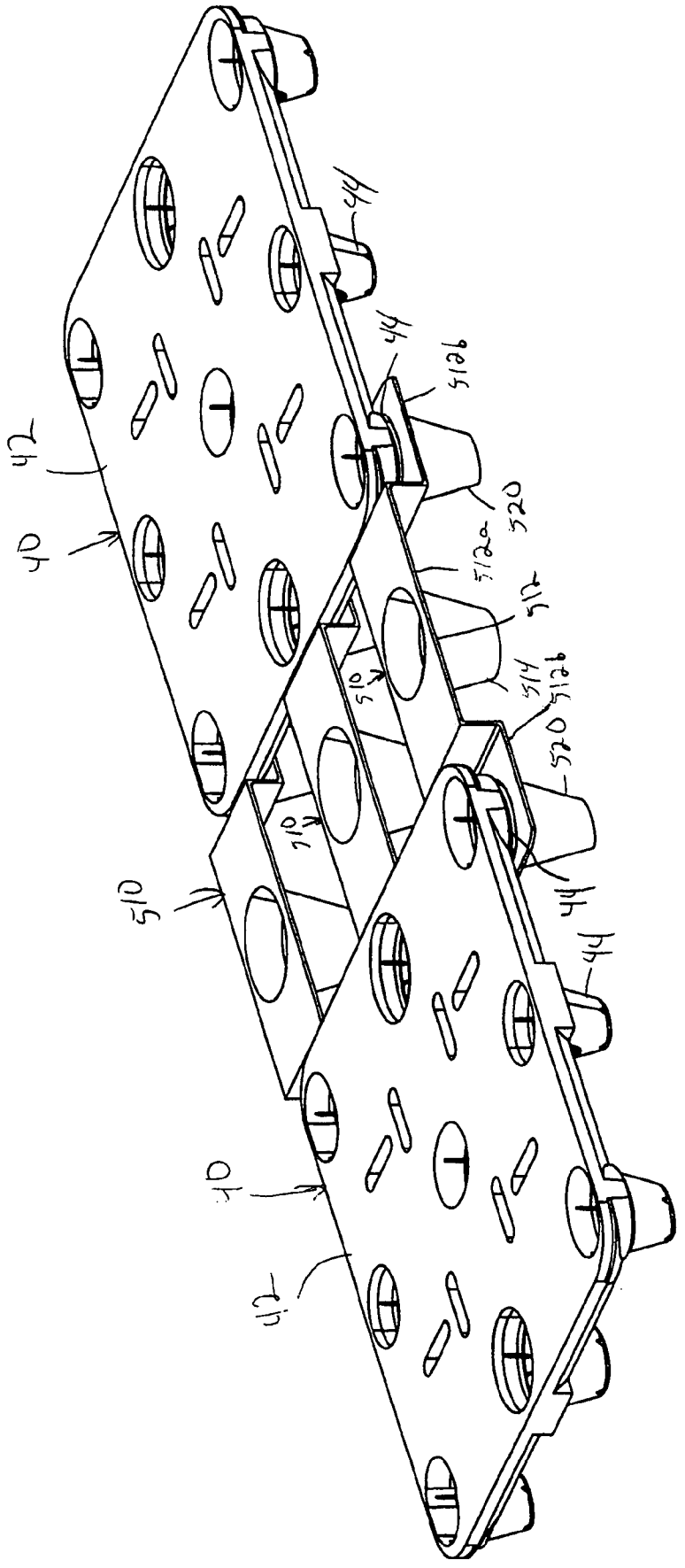
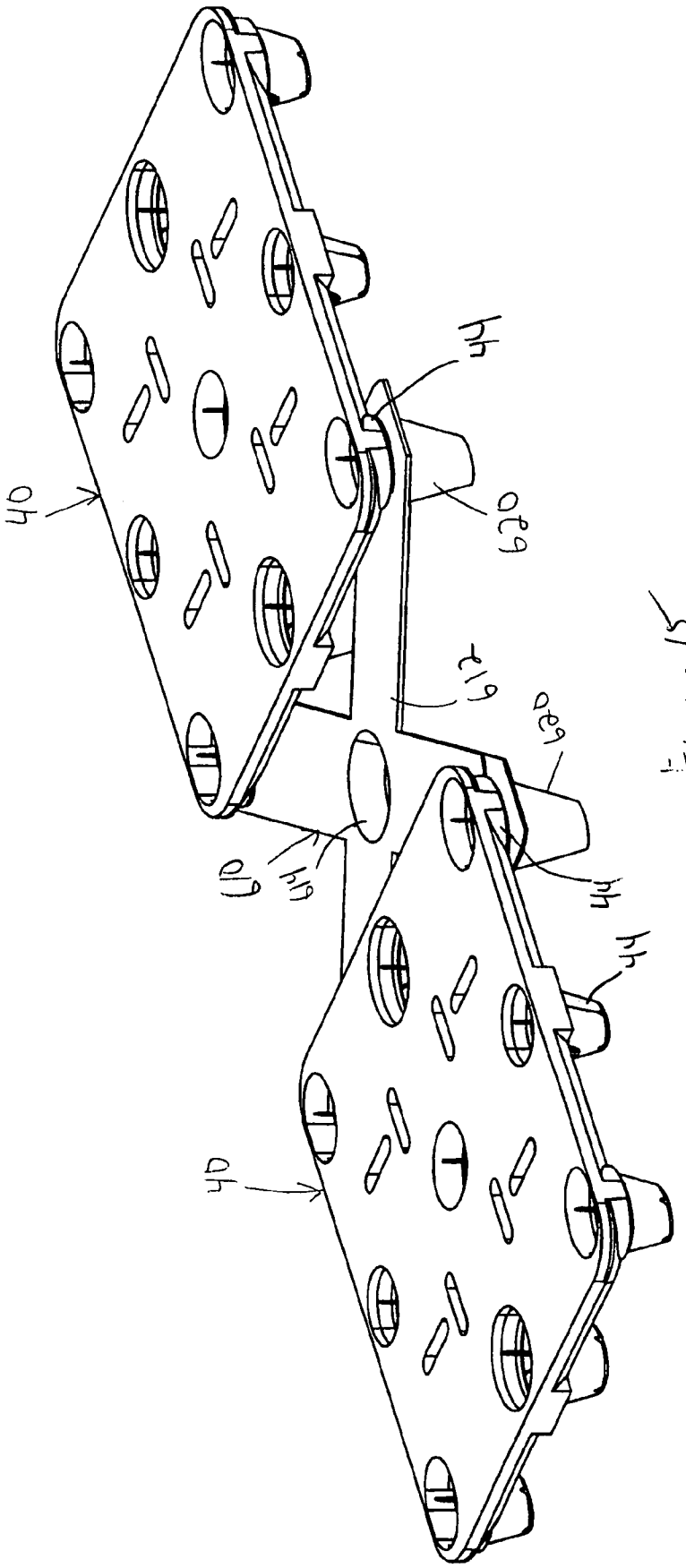


Figure 14



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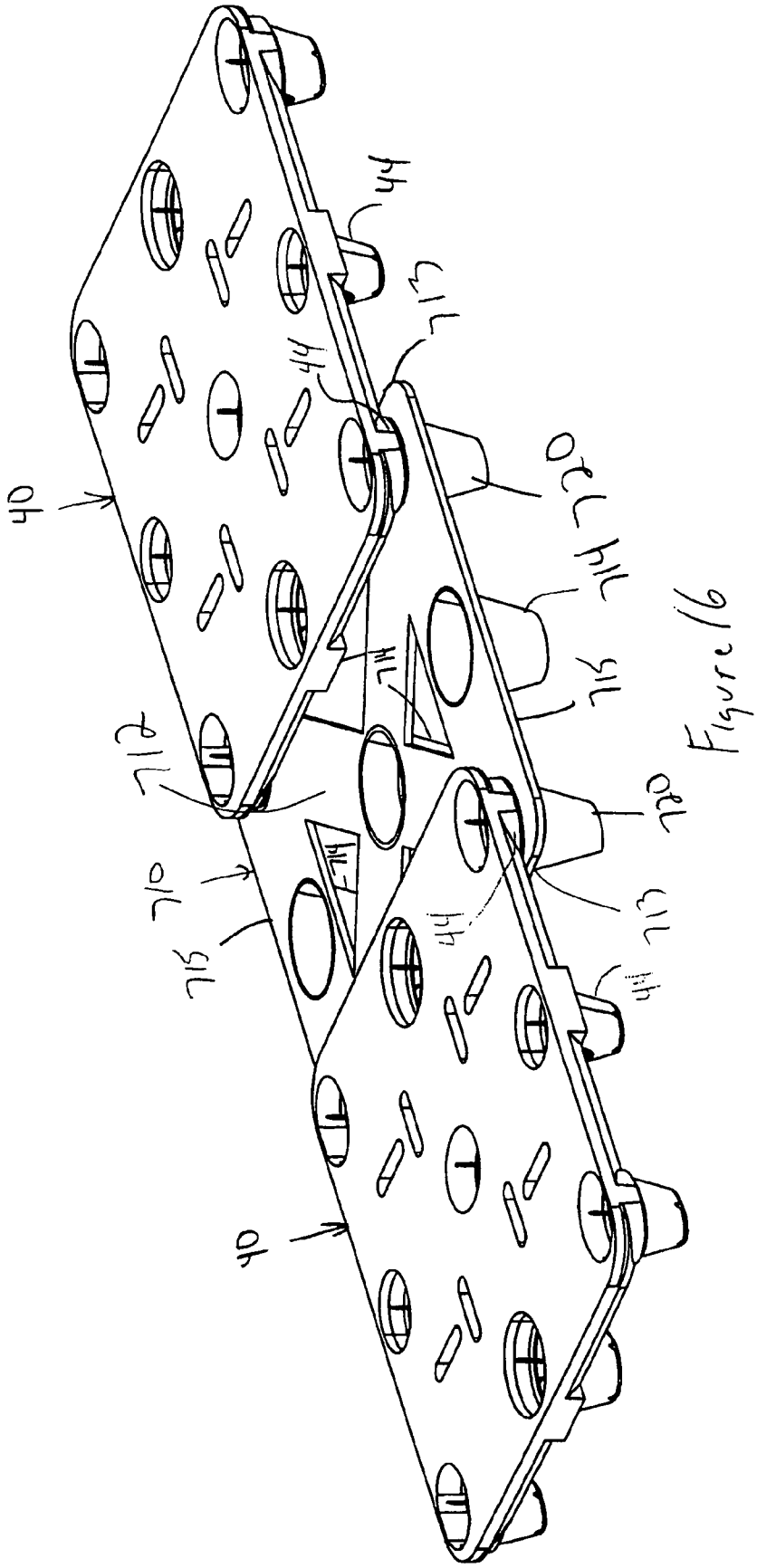

Figure 16

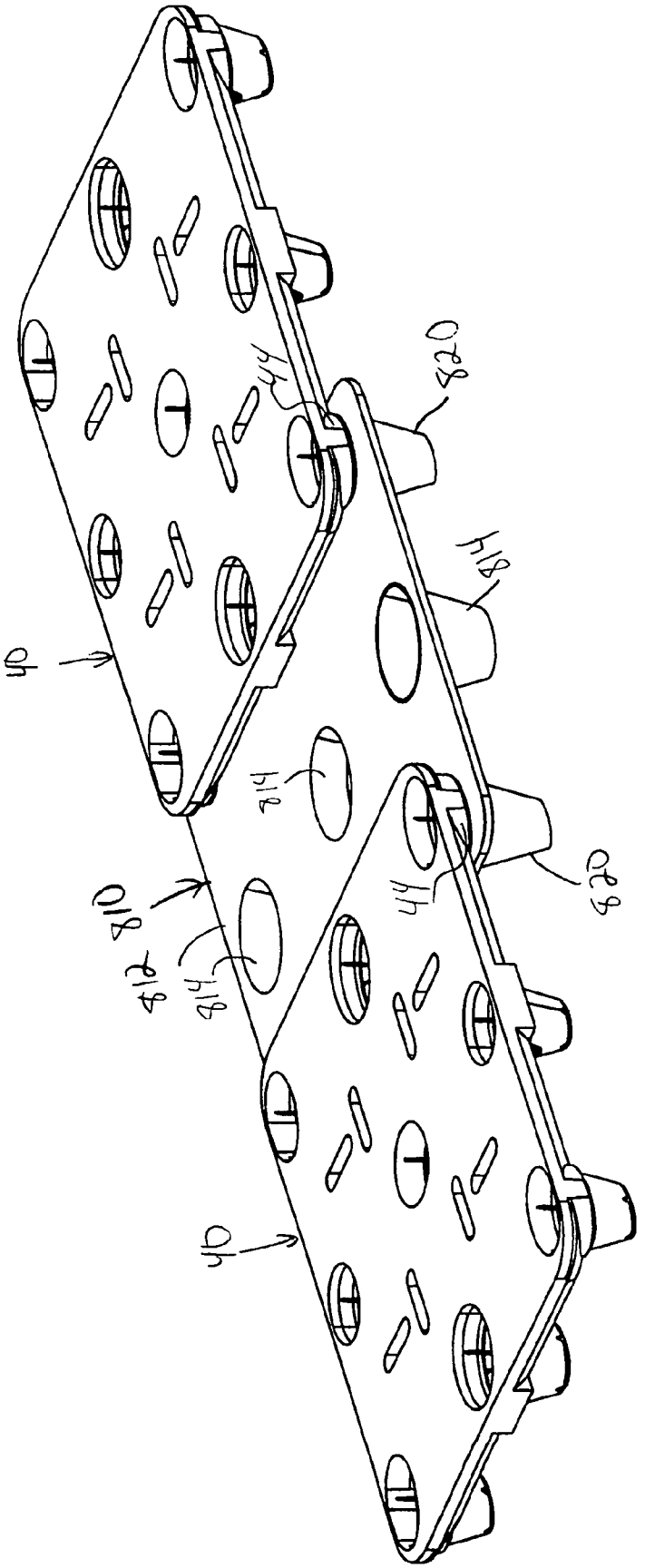

Figure 17

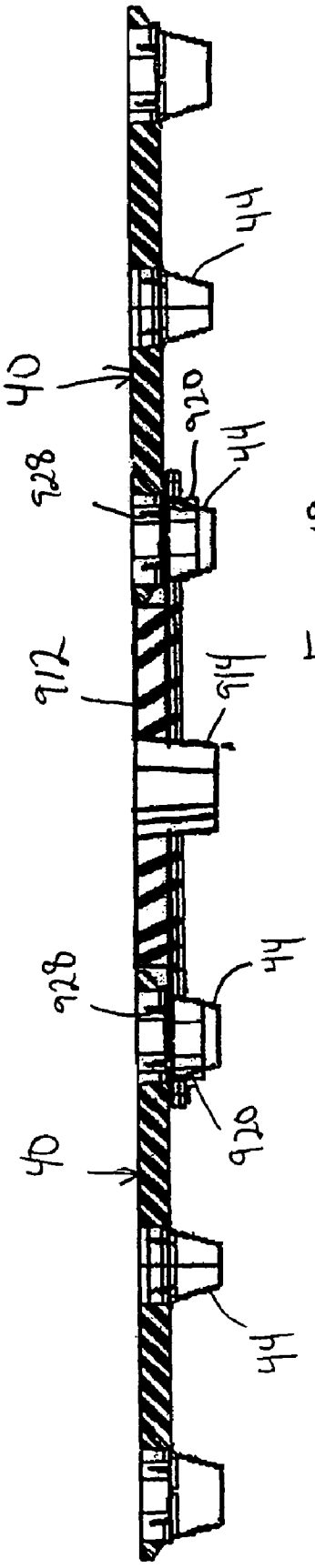

Figure 19

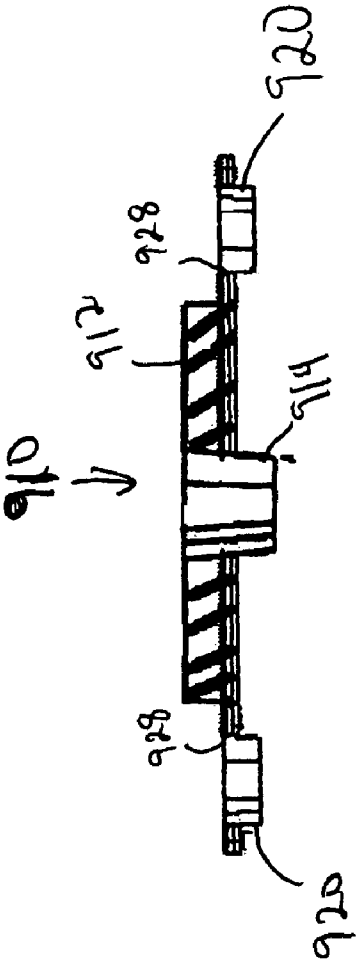

Figure 18

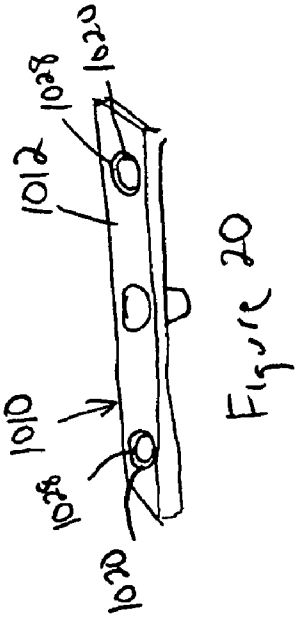

Figure 20

CONNECTOR FOR SUPPORT STRUCTURES

BACKGROUND OF THE INVENTION

The present invention relates generally to support structures and more particularly to a connector for connecting two support structures, such as pallets, to form a single, large support structure.

Pallets are often used to store and transport goods. Pallets maintain the goods at a distance above the floor such that they can readily be lifted and moved by a forklift. Plastic pallets are lighter and more durable than wooden pallets. Elongated metal or composite reinforcement members have been used in some plastic pallets in order to increase the stiffness and load-bearing capacity of the pallet.

Some plastic pallets are nestable. The nestable pallets generally include openings in the deck that are aligned with recesses in the feet, such that feet of one deck may receive the feet of another, like pallet stacked thereon. Nestable pallets reduce the overall size of the stacked pallets when empty for convenient transport and storage.

Pallets are typically provided in one of several standard sizes. Occasionally, it is desirable to use pallets for an object (such as a bundle of goods) that are greater than the size of the pallet, even greater than two or three times the size of the pallet. Two or more standard size pallets can be used adjacent one another if the object is rigid and self-supporting, but not if the object is non-rigid and needs a continuous rigid support structure.

SUMMARY OF THE INVENTION

The present invention provides a connector for connecting at least two support structures to provide a larger, rigid support structure. The connector includes a body portion from which extends downward a center support portion. A pair of outer sleeves extend downwardly from the body portion on opposite sides of the center support portion, each outer sleeve extending downwardly less than the center support portion. In several embodiments, the body portion is a single elongated body portion, x-shaped, a circumscribed x-shape, or planar.

In use, the outer sleeves are sleeved through openings in the support structures into the feet of the support structures. The body portion rests on the decks of the support structures and the center support portion extend downward from the body portion between the support structures. The center support portion is sized to extend to the floor when the connector is connected to the support structures.

BRIEF DESCRIPTION OF THE DRAWINGS

Other advantages of the present invention can be understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. **1** is a perspective view of a connector according to a first embodiment of the present invention.

FIG. **2** is a perspective view of three of the connectors of FIG. **1** and two support structures.

FIG. **3** is a perspective view of the connectors connecting the support structures of FIG. **2**.

FIG. **4** is a top view of the connectors and support structures of FIG. **3**.

FIG. **5** is a sectional view taken along line **5-5** of FIG. **4**.

FIG. **6** is an enlarged view of Area A of FIG. **5**.

FIG. **7** is a perspective view of a connector according to a second embodiment of the present invention.

FIG. **8** is a perspective view of the connector of FIG. **7** connecting two support structures.

FIG. **9** is a perspective view of a connector according to a third embodiment of the present invention.

FIG. **10** is a perspective view of the connector of FIG. **9** connecting two support structures.

FIG. **11** is a perspective view of a connector according to a fourth embodiment of the present invention.

FIG. **12** is a perspective view of the connector of FIG. **11** connecting two support structures.

FIG. **13** is a perspective view of three connectors according to a fifth embodiment of the present invention connecting two support structures.

FIG. **14** is a perspective view of three connectors according to a sixth embodiment of the present invention connecting two support structures.

FIG. **15** is a perspective view of a connector according to a seventh embodiment of the present invention connecting two support structures.

FIG. **16** is a perspective view of a connector according to an eighth embodiment of the present invention connecting two support structures.

FIG. **17** is a perspective view of a connector according to a ninth embodiment of the present invention connecting two support structures.

FIG. **18** is a sectional view through a connector according to a tenth embodiment of the present invention.

FIG. **19** is a sectional view through the connector of FIG. **18** connecting two support structures.

FIG. **20** is a perspective view of a connector according to an eleventh embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a connector **10** according to a first embodiment of the present invention includes an elongated body portion **12** and a center support portion **14**. The center support portion **14** has a generally cylindrical wall **16** extending downward from the center of the body portion **12** to form a foot portion. The wall **16** defines a center recess **18** therein.

A pair of outer sleeves **20** on either side of the center support portion **14** and at opposite ends of the body portion **12** each include a generally cylindrical wall **22**. The walls **22** each define an outer recess **24** therein. An opening **28** through the body portion **12** is aligned with each of the outer recesses **24** and the center recess **18**. The connector **10** is nestable with similar connectors **10**, such that the outer sleeves **20** and center support portion **14** can be received within the outer sleeves **20** and center support portion **14** of a like connector **10** stacked therebelow.

FIG. **2** illustrates three of the connectors **10** connecting two support structures **40**. In the example shown, the support structures **40** are nestable pallets having a deck **42** and generally cylindrical feet **44** extending downward therefrom. Openings **46** in the deck **42** are aligned with the feet **44**. The openings **46** are capable of receiving therein the feet **44** of a like pallet **40**, such that the pallets **40** are nestable.

To connect the two support structures **40**, the outer sleeves **20** of the connectors **10** are aligned with adjacent openings **46** along one peripheral edge of each support structure **40**. The outer sleeves **20** are then sleeveed into the openings **46** and into the feet **44** of the support structures **40**, as shown in FIGS. **3** and **4**. The two structures **40** and connectors **10** provide a single, large, rigid support for supporting objects, such as large, non-rigid objects.

FIG. **5** is a section view along lines **5-5** of FIG. **4**. As shown in FIG. **5**, the outer sleeves **20** are received within the feet **44** of the support structures **40**. When the connectors **10** are connected to the support structures **40**, the bottom-most edge of the center support portion **14** is co-planar with bottom-most edges of the feet **44** of the support structures **40**.

FIG. **6** is an enlarged view of Area A of FIG. **5**. When connected, the outer sleeve **20** of the connector **10** extends through the opening **46** in the deck **42** and into the foot **44** of the support structure **40**. The body portion **12** abuts the deck **42** of the support structure **40**.

FIG. **7** is a perspective view of a connector **110** according to a second embodiment of the present invention. The connector **110** includes an x-shaped body portion **112**. A generally cylindrical center support portion **114** extends downward from the intersection of the x-shaped body portion **112**. Generally cylindrical outer sleeves **120** extend downward from outer ends of the arms of the x-shaped body portion **112**. Openings **128** extend through the body portion **112** and are aligned with the outer sleeves **120** and the center support portion **114**.

FIG. **8** is a perspective view of the connector **110** of FIG. **7** connecting two support structures. When connected, the outer sleeves **120** of the connector **110** are received within the openings **46** in the deck **42** of the support structures **40**, until the outer sleeves **120** are received within the feet **44** of the support structures **40**. In this manner, the connector **110** and the two support structures **40** are connected as a single, large, rigid unit that is suitable for supporting large, non-rigid object (s). When connected, the bottom-most edge of the center support portion **114** is co-planar with the feet **44** of the support structures **40**, such as when the support structures **40** and connector **110** are resting on the floor.

FIG. **9** is a perspective view of a connector **210** according to a third embodiment of the present invention. The connector **210** includes an x-shaped body portion **212**, elongated side portions **213** and elongated end portions **215** connecting adjacent outer ends of the x-shaped body portion **212**. A generally cylindrical center support portion **214** extends downward from the intersection of the x-shaped body portion **212** and from the center of each of the end portions **215**. Generally cylindrical outer sleeves **220** extend downward from outer ends of the arms of the x-shaped body portion **212**. Openings **228** extend through the body portion **212** and are aligned with the outer sleeves **220** and the center support portion **214**.

FIG. **10** is a perspective view of the connector **210** of FIG. **9** connecting two support structures **40**. When connected, the outer sleeves **220** of the connector **210** are received within the openings **46** in the deck **42** of the support structures **40**, until the outer sleeves **220** are received within the feet **44** of the support structures **40**. In this manner, the connector **210** and the two support structures **40** are connected as a single, large, rigid unit that is suitable for supporting large, non-rigid object (s). When connected, the bottom-most edge of the center support portions **214** are co-planar with the feet **44** of the support structures **40**, such as when the support structures **40** and connector **210** are resting on the floor. The side portions **213** rest on the decks **42** of the support structures **40**.

FIG. **11** is a perspective view of a connector **310** according to a fourth embodiment of the present invention. The connector **310** includes generally planar body portion **312**. Three generally cylindrical center support portions **314** extend downward along a centerline of the body portion **312**. Three generally cylindrical outer sleeves **320** extend downward from each end of the body portion **312**. Openings **328** extend through the body portion **312** and are aligned with the center support portions **314** and outer sleeves **320** and center support portions **314**.

FIG. **12** is a perspective view of the connector **310** of FIG. **11** connecting two support structures **40**. When connected, the outer sleeves **320** of the connector **310** are received within the openings **46** in the deck **42** of the support structures **40**, until the outer sleeves **320** are received within the feet **44** of the support structures **40**. In this manner, the connector **310** and the two support structures **40** are connected as a single, large, rigid unit that is suitable for supporting large, non-rigid object(s). When connected, the bottom-most edge of the center support portions **314** are co-planar with the feet **44** of the support structures **40**, such as when the support structures **40** and connector **310** are resting on the floor, as shown. The body portion **312** of the connector **310** rests on the deck **42** of the support structures **40**.

FIG. **13** is a perspective view of three connectors **410** according to a fifth embodiment of the present invention connecting two support structures **40**. The connector **410** includes an elongated body portion **412** and a center support portion **414**. A pair of outer sleeves **420** on either side of the center support portion **414** and at opposite ends of the body portion **412** are aligned with an opening **428** extending through the body portion **412**. The connector **410** is nestable with similar connectors **410**, such that the outer sleeves **420** and center support portion **414** can be received within the outer sleeves **420** and center support portion **414** of a like connector **410** stacked therebelow.

To connect the two support structures **40**, the feet **44** of the support structures **40** are inserted into the outer sleeves **420** of the connectors **410** through the openings **428**. The two structures **40** and connectors **410** provide a single, large, rigid support for supporting objects, such as large, non-rigid objects.

FIG. **14** is a perspective view of three connectors **510** according to a sixth embodiment of the present invention connecting two support structures **40**. The connector **510** includes an elongated body portion **512** a center body portion **512***a*, which is elevated relative to two outer body portions **512***b*. A center support portion **514** extends downward from the center body portion **512***a*. A pair of outer sleeves **520** are each aligned with an opening **528** extending through one of the outer body portions **512***b*. The connector **510** is nestable with similar connectors **510**, such that the outer sleeves **520** and center support portion **514** can be received within the outer sleeves **520** and center support portion **514** of a like connector **510** stacked therebelow. To connect the two support structures **40**, the feet **44** of the support structures **40** are inserted into the outer sleeves **520** of the connectors **510** through the openings **528**. The two structures **40** and connectors **510** provide a single, large, rigid support for supporting objects, such as large, non-rigid objects. The elevated center body portion **512***a* provides a continuous surface with the decks **42**.

FIG. **15** is a perspective view of a connector **610** according to a seventh embodiment of the present invention connecting two support structures. The connector **610** includes an x-shaped body portion **612**. A generally cylindrical center support portion **614** extends downward from the intersection of the x-shaped body portion **612**. Generally cylindrical outer sleeves **620** extend downward from outer ends of the arms of the x-shaped body portion **612**. To connect the two support structures **40**, the feet **44** of the support structures **40** are received in the outer sleeves **620** of the connector **610**.

FIG. **16** is a perspective view of a connector **710** according to an eighth embodiment of the present invention connecting

two support structures **40**. The connector **710** includes an x-shaped body portion **712**, elongated side portions **713** and elongated end portions **715** connecting adjacent outer ends of the x-shaped body portion **712**. A generally cylindrical center support portion **714** extends downward from the intersection of the x-shaped body portion **712** and from the center of each of the end portions **715**. Generally cylindrical outer sleeves **720** extend downward from outer ends of the arms of the x-shaped body portion **712**. The feet **44** of the support structures **40** are received in the sleeves **720** of the connector **710** to connect the support structures **40**.

FIG. **17** is a perspective view of a connector **810** according to a ninth embodiment of the present invention connecting two support structures **40**. The connector **810** includes generally planar body portion **812**. Three generally cylindrical center support portions **814** extend downward along a centerline of the body portion **812**. Three generally cylindrical outer sleeves **820** extend downward from each end of the body portion **812**. The feet **44** are received in the outer sleeves **820** of the connector **810** to connect the two support structures **40**.

FIG. **18** is a sectional view through a connector **910** according to a tenth embodiment of the present invention. The connector **910** could be a 1×3 connector similar to those in FIGS. **1**, **13** and **14** or a 3×3 connector as shown in the other embodiments. The connector **910** includes a body portion **912** from which a center support portion **914** and outer sleeves **920** extend downwardly. The outer sleeves **920** define openings **928** through the connector **910**. In this embodiment the outer sleeves **920** do not extend to the floor, but are open at the bottom so that the feet **44** of the support structures **40** can extend through them to the floor, as shown in FIG. **19**.

The outer sleeves **1020** could also simply be the openings **1028** through the body portion **1012**, as shown in an eleventh embodiment of the present invention in FIG. **20**.

The connector **10** to **1010** of the present invention could be made of polypropylene, HDPE, polycarbonate or any other suitable material, such as via an injection-molding or any other suitable process. All of the embodiments are nestable.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. For example, several possible shapes of the body portion **12** to **1012** are shown, but other shapes of the body portion could also be used. Also, the connector **10** to **1010** has been shown connecting two standard-size full pallets that each have nine feet arranged three by three, but could also be used with non-standard two by three or one by three pallets. It could also be used to connect support structures of different size, shape, configuration, numbers of feet and aspect ratios. The connector could connect non-standard size pallets or non-standard size support structures.

What is claimed is:

1. A connector connecting at least two support structures, the connector comprising a body portion, a center support portion extending a first distance downwardly from the body portion, and outer sleeves extending downwardly from the body portion on opposite sides of the center support portion, each outer sleeve extending downwardly less than the center support portion; and

at least two support structures, each support structure including at least one foot portion having a nesting recess therein, wherein the outer sleeves of the connector are each received within the nesting recess of a different one of the two support structures, wherein at least one of the support structures is a pallet.

2. The connector and support structures of claim **1** wherein the at least one of the support structures includes a deck from which extends the at least one foot portion, the deck including an opening aligned with the nesting recess of the at least one foot portion, one of the outer sleeves of the connector received within the opening in the deck and the nesting recess.

3. A connector for connecting at least two support structures comprising:

a body having an upper surface;

a support extending downwardly from the body;

a first sleeve extending downwardly from a first end of the body and having a bottom-most edge at a first distance from the upper surface of the body, the support having a bottom-most edge at a second distance from the upper surface of the body, the first distance being less than the second distance;

a second sleeve extending downwardly from a second end of the body, the second end opposite the first end, wherein the support, the first sleeve and the second sleeve are nestable with a support, first sleeve and second sleeve of a similar connector;

wherein the connector is connected to two support structures, each support structure including at least one foot portion having a nesting recess therein, wherein the first and second sleeves of the connector are each received within the nesting recess of a different one of the two support structures; and

wherein at least one of the support structures is a pallet.

4. The connector of claim **3** wherein the upper surface of the body supports objects thereon, the first sleeve has a bottom-most edge at a first distance from the upper surface of the body and the support has a bottom-most edge at a second distance from the upper surface of the body, the first distance being less than the second distance.

5. The connector of claim **4** wherein the second sleeve has a bottom-most edge at the first distance from the upper surface of the body.

6. The connector of claim **5** wherein the support is taller than the first sleeve.

7. The connector and support structures of claim **3** wherein a bottom-most edge of the at least one foot portion of each of the two support structures, and the bottom-most edge of the support, define a plane.

8. The connector and support structures of claim **7** wherein the at least one of the support structures includes a deck from which extends the at least one foot portion, the deck including an opening aligned with the nesting recess of the at least one foot portion, one of the first and second sleeves of the connector received within the opening in the deck and the nesting recess.

9. The connector of claim **3** connected to two support structures, each support structure including a plurality of foot portions each having a nesting recess therein, wherein the foot portions are at least partially nestable within the nesting recesses of a like support structure, and wherein the first and second sleeves of the connector are each received within the nesting recess of a different one of the two support structures.

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